

THE STUDY OF MAN

WILL BIRTHS OUTSTRIP MANKIND'S RESOURCES?

A Challenge to Human Ingenuity

MORTON CLURMAN

ALMOST forty years ago an agricultural economist, George F. Warren, wrote: "The questions whether our soil is exhausted and how we are to be fed in the future, are constantly being discussed in newspapers and magazines." This ought to remind us that the modern food-versus-population controversy is not simply a product of post-World War II pessimism. It has been around for a long time. But it has been percolating with exceptional vigor ever since William Vogt's *Road to Survival* and Fairfield Osborn's *Our Plundered Planet* reopened the dispute four years ago. Thus, a dispatch from Rome tells us that even Pope Pius's recent statement affirming the opposition of the Church to birth control was made only after a careful study of the population-versus-food question.

In the days before I. B. M. machines it was possible for any reasonably intelligent man to get into the middle of a discussion like this and take his stand; the facts, being unavailable,

A HUNDRED and fifty years ago, a British cleric drew some startling conclusions from the fact that, while the earth's surface is limited, man's capacity for reproduction is not. Since then, Malthusian pessimism has waned and waxed, as food production surpassed or fell below the rapid growth of population. Recently, the controversy between the Cassandras and the Pollyannas has flared up again, with some authorities predicting a "population explosion" and others pooh-poohing the very notion. Here, MORTON CLURMAN takes a hard look at the statistics and the logic of both sides. Mr. Clurman was born in New York City in 1917 and was graduated from the City College of New York. He is on the staff of the American Jewish Committee.

played a minor role in shaping opinion. Today, in the age of science, any argument not buttressed by a maze of figures is considered suspect. But where, as in the present case, both sides to a dispute can assemble an equally impressive stack of charts, tables, and diagrams, the statistics may merely bury the argument without settling it.

For example, the neo-Malthusians, or pessimists, tell us that every year the world's population is growing by slightly more than 1 per cent. That makes twenty-five million more mouths to feed every twelve months and this number accelerates as the earth's population expands. At the present rate of increase, the world's population, now almost two and a quarter billion, will reach three billion in fifty years, over four billion in one hundred years, nearly eighteen billion in two hundred years, and one hundred billion in four hundred years.

Now, only 2 per cent of the earth's surface is crop land on which food can be grown efficiently, which means that there are about two arable acres per person. This figure is shrinking rapidly as population increases, yet at the present time more than three-fifths of the world's inhabitants live on near-starvation rations. With the United States' farming practices, which are superior to most, it takes two and one-half acres to keep one person well fed and properly clothed. So our worldwide two-acre average is already too low—with the future gloomy indeed.

But things look a lot brighter when the optimists take their turn at the computing machines. Food production can be increased at the rate of 1.5 per cent per annum—this tops the population increase by almost .5 per cent, so the table can stay well ahead of the cradle. It is only the populations in the backward, un-

industrialized portions of the globe that are increasing at an alarming rate—with the industrialization and urbanization of these backward lands their population growth will begin to taper off in a civilized fashion. Even more promising are the spectacular developments in technology that promise to master nature's secret of food manufacture by photosynthesis and thus provide cheap and abundant food for many billions more people. In addition, new agricultural techniques combined with the development of new species such as hybrid corn are opening an unprecedented era of abundance. Thus, in 1944, farmers in the United States harvested 44 per cent more corn, using only 5 per cent more acreage, than they did in any year from 1935 to 1939. This represents a truly spectacular increase, in less than a decade, of 32 per cent per acre. The yield per acre of cotton jumped from 174 pounds per acre in 1928-1932 to 260 pounds in 1941-1945—an increase of 50 per cent in a dozen years. What we can do, so can others; the world has little to worry about. So runs the argument of the optimists.

Whom are we to believe?

THE argument of the pessimists goes back to Malthus, who said in the first of his three main propositions: "It may be safely pronounced, therefore, that population, when unchecked, goes on doubling itself every twenty-five years, or increases in a geometrical ratio. . . . Considering the present average state of the earth, the means of subsistence, under conditions most favorable to human industry, could not be made to increase faster than in an arithmetical ratio. . . . Supposing the present population to be a thousand millions, the human species would increase as the numbers 1, 2, 4, 8, 16, 32, 64, 128, 256; and subsistence as 1, 2, 3, 4, 5, 6, 7, 8, 9; in two centuries the population would be to the means of subsistence as 256 to 9, in three centuries as 4,096 to 13. . . ."

But, of course, there are the "population checks," which Malthus divided into two kinds—"positive" and "preventive." Positive checks were those imposed by nature—famine, disease, wars, and vice; while preventive checks were those voluntarily imposed by man on himself, such as celibacy, delayed marriage, or continence after marriage. Birth control, except when based on continence, Malthus classified as vice.

Under certain specific conditions, the Malthusian doctrine does have an important measure of truth. It is drawn by analogy from the

least rigorous of the natural sciences, biology, and it can be applied to man in direct proportion to man's social proximity to the animal world. In pre-industrial and primitive agrarian economies, the food supply is the chief limiting factor on population growth and it is easily possible to demonstrate this relation.

Some two years ago, Warren S. Thompson, director of the Scripps Foundation for Research in Population Problems, did just that in an article in *Scientific American* (February 1950). He analyzed the doubling of Sweden's population from 1751 to 1850. He showed that although the rate of increase for the entire century averaged 6.7 per 1,000 yearly, actually there were enormous fluctuations varying from a natural increase of 16 per 1,000 during one year to a decrease of 27 per 1,000 in another. In these fluctuations, the key factor was the death rate, which varied far more than the birth rate. In every year in which deaths were abnormally high, says Thompson, "the high death rate was preceded by a period of scarcity of food, generally accompanied by an increase in epidemic disease." Food also affected the birth rates, though less severely, with good harvests being followed by an increase in marriages, and a corresponding rise in births. Thus, the death rate followed the harvest curve inversely, the marriage and birth rates followed it directly.

But when the first proposition of Malthus is applied to a Western industrial civilization it collapses completely. For this proposition assumes that population always and inevitably presses on food supplies—in other words, that there is a high and constant birth rate. Yet the Swedish figures, extended beyond 1850 to modern times, show that the conquest of epidemic and famine has not only lowered the mortality rate from about 20 per thousand to less than 10, but that, at the same time, the birth rate has declined from 31 per 1,000 to about 14 per 1,000 in the 1930's, indicating a virtually stationary population. Sweden typifies the highly un-Malthusian population situation in the industrial nations—low birth rates, low death rates, and a low or stationary rate of natural increase.*

* The postwar spurt in births, which sent Sweden's rate from a low of 13.7 in 1934 to a recent high of 20.6 in 1944, and the United States rate from a low of 16.6 in 1933 to a recent high of 25.8 in 1947, has somewhat upset the population experts. There are indications, however, that the birth rate has again begun to recede.

To understand how badly the Malthusian proposition really operates when applied indiscriminately to the modern world, one has only to stand the axiom on its head and observe its superiority in this inverted form. In other words, a very good case can be made out for the thesis that population increase is *inversely* proportional to the food supply. Ireland, Scandinavia, and Australia, all areas that consume more than 3,000 calories daily, have a low rate of natural increase. India, North Africa, and Central America, which consume less than 2,000 calories daily, have a high rate of natural increase. In general, it is in the areas that live on a subsistence food level that population is increasing fastest. Countries in which there is plenty to eat have relatively stationary populations.

THE operation of Malthus's powerful law has been dampened, not so much by the new-fangled techniques of Farmer Simpson, as a *Time* article too glibly put it, as by the fact that human beings obstinately refuse to act like fruit flies as soon as they discover the conveniences of modern civilization. Social and cultural factors, rather than the bio-technical one of food production, have proved decisive in determining the rate of natural increase in industrial societies. But most of the world today is still living under pre-industrial conditions, where Malthus's doctrine is applicable and where the population *does* fluctuate very much according to the availability of food. It is the failure to recognize this distinction in population patterns, to narrow the field to specific areas and sharply defined problems, that gives most of the writing on the subject, whether pro-Malthusian or con, a nebulous, inconclusive quality.

A happy exception to this rule is the previously mentioned article by Warren Thompson. Thompson divides the countries of the world into three areas. Group A, consisting of most of Western Europe, Oceania, and North America, makes up about 20 per cent of the world's population. It is characterized by low birth rates, low death rates, high caloric intake (about 3,000 per day), and a relatively stable population. The food problem of these countries is negligible, and there seems to be no doubt of their ability to feed their inhabitants in any foreseeable future.

Group B, another 20 per cent of the world's population, consists of Eastern and Southeastern Europe, Japan, Spain, and a few South American countries like Brazil and Argentina. Here

there is a low but rising industrial productivity, a high but falling birth rate, and a medium but falling death rate. These areas have the highest rates of natural increase, largely because their birth rate is not falling as fast as the death rate. Since they enjoy a food level of 2,300 to 2,800 calories per day—somewhat better than subsistence—the food-versus-population problem in these countries will depend largely on how fast they industrialize and what measures are taken to increase their food supplies.

Group C is the critical area. Taking in Asia and its adjacent islands, most of Africa, and most of South and Central America, it contains three-fifths of the world's population, lives on a semi-starvation level, about 2,000 calories per day or less, and starkly illustrates the Malthusian pressure of population on food. The area has a high and constant birth rate, and a high but widely fluctuating death rate, which drops when the harvests are good, soars when they are bad. It is an area whose perpetual state of crisis is broken only by periodic catastrophes. The immensity of its food problems reminds one of the grim joke Jimmy Durante used to tell about his family, consisting of his "mudder, fadder, and fourteen kids," all of whom lived in a leaky one-room shack with nobody working. If they were lucky they had a dry crust of bread for them all to gnaw on. Things went on this way for a number of years but then, said Durante, "came the depression."

It is this area that constitutes the real problem—the three-fifths of mankind that live on a starvation level. They have probably always lived this way, but what is different today is that assorted political fanaticisms are sweeping these countries on an unprecedented scale, and are combining with hunger to make an explosive mixture. And with Russia busily tossing matches, a problem that the richer nations once might shrug off now threatens to ignite the world.

THE virtue of Warren Thompson's approach is that by narrowing the field, it permits the problem of food versus population to be stated in a meaningful way. In terms of pointing the way toward solutions, however, it is still too broad. The variations among the group C countries are too large, the unique political and social factors too many, to permit of any general analysis. Actually, each country must be examined separately in order to see a way through the dilemma.

Kingsley Davis's imposing and remarkable book *The Population of India and Pakistan* (Princeton University Press, 1951) is an excellent example of the techniques which must be applied to make any sense out of the great Malthusian debate. Davis's work points up some of the enormous difficulties in understanding the demographic dynamics of these countries, or even in gathering the vital statistics. Tigers with indiscriminating appetites have combined with irritable villagers to keep the mortality rate of census-takers high. The 1931 census had to contend with a Census Boycott Sunday organized by Indian nationalists. A religious sect urged everybody to list a certain religion regardless of the truth. In one province, a primitive group, the Bhils, would not have their houses enumerated on superstitious grounds, while in Burma the householders objected for aesthetic reasons. In the Shan states, the last survivor of a bandit raid, convinced that his number was up when his house was listed as the thirteenth in a block, went into the woods and committed suicide. Elsewhere, superstitious extroverts disemboweled the census-takers.

Mortality statistics present special problems in India because most people die without ever having seen a doctor. The death is usually reported, if at all, by the village headman or *chaukidar*. He is always ill-paid, often illiterate, and seems to operate on the slogan: "When in doubt call it fever." Thus, 60 per cent of the recorded deaths are ascribed to "fever," over 25 per cent to "other causes." The cause of death in India is consequently unknown in at least 85 per cent of the reported cases.

Despite these difficulties, Davis tells us that India's statistics are actually far more reliable than that of any other country of comparable backwardness. British scholarship and persistence, he believes, are responsible for this relative reliability. Whatever its other shortcomings, the British administration did bequeath a tremendous fund of scholarly information, together with a bureaucratic apparatus and an objective attitude that are probably unique among areas that have recently become self-governing.

INDIA's demographic statistics go back to 1871, when the first census estimated a population of 255 million. The next fifty years were marked by the same wide variation in death rates and population growth that Thompson showed for Sweden in the century between 1750 and 1850. Thus, in 1871-1881, the popu-

lation rose only 2 million, but the following decade the jump was 15 million. Then, in 1891-1901 the increase sank again to 3 million, but it leaped to almost 18 million during the next ten years. In the succeeding decade, the increase once more dropped, this time to less than 3 million.

The reason for these peculiar fluctuations is known, and it fits in well with the general picture of the Malthusian countries. The Indian famine of 1876 slashed that decade's increase; the decade of 1891-1901 was marked by another famine; the 1911-1921 period was punctuated by the terrible influenza epidemic of 1918. Over the entire fifty years from 1871 to 1921 the population of India and what is now Pakistan rose from 255 to only 305 million, or about .35 per cent each year.

Then the picture changed completely. The 1931 census showed a ten-year growth of 33 million. The 1941 census came through with another ten-year jump of more than 50 million. And the recently released 1951 census indicates a combined population for India and Pakistan of 437 million—a decade's growth of 48 million. Thus, in the thirty years since 1921, India's population increased 132 million or about 1.2 per cent each year. What has happened is that the famine and epidemic peaks have been lopped off, leaving a huge predominance of births over deaths to swell the natural increase. For, as a result of the consolidation of British rule in the 19th century, local isolation was broken down by the construction of railroads and hard-surfaced roads, civil war and banditry were suppressed, a tremendous irrigation program was undertaken, and famine on a large scale was brought under control—India's last great famine came in 1898. (The famine of 1943 took one and a half to three million lives—by Indian standards a small affair.)

There remained the problem of epidemic disease. Plague, which was virtually unknown in India until 1896, killed over a million in 1904. For twenty years it raged periodically. Then, new methods of rat control were devised, vaccines and new drugs were developed, and, perhaps most important, a new race of rats developed that seems immune to bubonic germs. Since 1924 there have been no major outbreaks of plague. Smallpox, another mass killer in the 19th century, was brought under control through vaccination by 1900. Kala-azar, an extremely deadly epidemic disease that used to wipe out whole villages and areas, was brought

under successful control by 1923. Malaria, now believed to be the greatest killer of all, is being reduced by modern drugs and DDT. Tuberculosis, on the other hand, appears to be increasing in India, probably because those who formerly would have died in epidemics or famine now live to fall prey to it. Diarrhea, dysentery, and typhoid take a huge toll of infants, but the use of DDT, sulfa drugs, and T.A.B. vaccine for typhoid are reducing these to manageable proportions. All these medical advances have brought the death rate down from a high of 47 per 1,000 to 31.2 in 1941, with the 1951 census revealing a further drop.

THE 1951 census indicates that the population of India and Pakistan is increasing at about 1.16 per cent annually. This is not an abnormally high rate. Percentage-wise it is lower than the present United States rate of increase (about 1.4 per cent, more than the world average) and almost exactly matches the world rate. Nor can India be considered overpopulated in the sense of being absolutely overcrowded; with her population density of 270 per square mile, she compares favorably with the 718 of England and Wales, Holland's 717, Japan's 500, Germany's 352, and Italy's 380.

These figures illustrate the relative nature of overpopulation. It is population in proportion to developed resources that actually counts. Had India a viable, thriving economy, its present rate of population increase would present no overwhelming problem. But how is such an India to be created? Unfortunately, the pressure of population hampers the very process of industrialization which eventually could solve India's problems.

India's agriculture graphically illustrates her dilemma. Overpopulation is probably its chief problem and leads to a complicated chain of ills. The growing population, unable to find employment in the insufficiently industrialized urban areas, competes desperately for a scrap of land on which to live. This sends the value of land up, the value of the tenant's labor down. With labor so cheap and land so dear, there is little incentive for capital investment on the part of the landlord, while the tenant is generally unable to afford any improvements, and is reluctant in any case to make them on another's land. This fierce struggle for land, which is literally a struggle for life, causes continual reductions in the size of holdings (from 2.23 cultivated acres per farm person in 1890 to 1.9 in

1939), and most areas have long since passed the point of diminishing returns as far as the application of labor to land is concerned. So to India's scantness of acreage per cultivator is added the problem of low productivity per acre.

All these misfortunes—and many others not even hinted at—have combined to make India one of the poorest nations in the world. Despite the most arduous labor, the average Indian eats about 1,750 calories per day (as against a needed 2,400 to 3,000). Clearly, undernourishment and dire want can be remedied only by increasing both agricultural and industrial production faster than the population is increasing. This is a large order. For one thing, the utter poverty makes the accumulation of a surplus for investment very difficult. And even assuming that some way could be found of quickly increasing the food supply, either through borrowed capital or by revolutionary new techniques requiring little capital, the population, under present conditions, would tend to rise in true Malthusian fashion so quickly that the per capita food consumption and income would probably remain about the same.

The only way of breaking the vicious circle, according to Davis, is by a simultaneous threefold program of agricultural reform and rehabilitation, rapid industrialization, and government-sponsored birth control. New industrial ventures would absorb the surplus farm population, an essential precondition to increasing farm productivity both per capita and absolutely. The land, instead of being "divided up," would be consolidated into larger parcels by socialized forms of agriculture like cooperatives and collectives, or by subsidy of the more efficient individual peasants, or by any combination of the two. Birth control would further ease the population pressure; at the same time, the growing urban centers would also tend to reduce the birth rate by shifting the population from a Malthusian to a non-Malthusian social pattern.

Since industrialization itself would create a non-Malthusian country, the question may be raised as to why this alone would not suffice for a population policy. Davis cites several objections: first, population pressure retards industrialization by making it difficult to accumulate a capital surplus; secondly, even the most rapid industrialization would take at least a generation; in that time, judging from the present pattern, population would have grown enormously, creating new problems and certainly robbing the country of much of the benefits

of industrialization. Finally, and most important, industrialization without population control would almost certainly necessitate a dictatorship of the Russian type which would accumulate capital by forced collectivization, ruthless exploitation of labor, and minute regulation of every phase of life.

IS THIS proposed three-pronged solution feasible in terms of the social and political realities of India today? The only rational answer to such a question is—perhaps. Japan managed to become an industrial nation in hardly more than a generation, without the horrors that accompanied the industrialization of Russia; and yet, in 1870, at the beginning of its industrialization effort, Japan was almost as densely populated as India is today—235 per square mile compared with India's 270. But Japan had a far more efficient agriculture; a thriving pre-industrial handicraft system which was readily converted into industrial workshops and could provide thousands of skilled artisans for industry; and a stable and cohesive ruling class with long experience, whose government carefully nurtured and subsidized the growing industries.

India has none of these. Her agriculture is miserably inefficient; her handicraft industry was virtually destroyed by the British government in India in collaboration with British manufacturers, who flooded the unprotected Indian market with cheap textiles; while her governing regime, with little experience and less cohesion, seems to be seated on the lid of a perpetual political volcano.

Fortunately, this gloomy balance sheet is not the whole picture. India's natural resources are incomparably greater than Japan's. Indeed, India's natural wealth is greater than that of any other country except Russia and the United States. She has immense coal and iron deposits lying close together; a wide distribution of other metallic ores, and large reserves of oil; in short, most of the raw materials for a thriving industry.

The problem is one of organization, not of resources; and that is mainly a question of politics. A government that could unite decisive sections of the population behind a program of birth control, agricultural rehabilitation, and directed investment in industry could lead India into a non-Malthusian future with relative freedom from coercion. A government that fails to win such support will either be helpless in the face of an ever-mounting cycle of food crises or else be forced to impose on the nation a terror-

istic dictatorship that will carry out a program of forced agricultural collectivization and rapid industrialization at the cost of millions of lives.

DAVIS's study of India provides the necessary clues for a solution to the whole problem of food versus population. It would appear that nations like Egypt, India, and China, until they produce a predominantly urban culture, will have a Malthusian population growth, fluctuating with variations in the food supply—unless an aggressive birth-control program is instituted. But birth control is no final solution for these nations. Only a vastly increased production of food and manufactured goods can provide their peoples with improved living standards. However, birth control, by easing the pressure on present resources, can make the transition easier and quicker.

What are the possibilities of the Malthusian countries adopting a vigorous birth-control policy? A great deal of nonsense has recently been written about this question. William Bullitt not long ago stated that India was an unlikely field for birth control because, among other reasons, "the most widespread object of worship among the Hindus is the male organ of generation. . . ." Unfortunately for this thesis, the Christians and Moslems of India, despite a more conventional form of worship, have a higher birth rate than the Hindus.

Actually, as Davis points out, an intensive government-sponsored birth-control campaign has never been tried, and we just don't know what the results of such a campaign would be. But the chances of the Malthusian nations adopting large-scale birth-control programs are not great. Aside from the sociological and technological difficulties involved, which are certainly not small, prevailing ideologies seem to be linked in an unconscious conspiracy against it. The Communists, whose approach, terminology, and influence are great even in those countries that have formally banned the party, are committed to the creed that reactionary capitalism is the unique cause of all evil and that any other issue is a trickily conceived attempt to stifle the class struggle. Nationalist sentiment, especially in those countries recently liberated from Western domination, also tends to regard with suspicion any argument that does not assign exclusive villainy to Western imperialism. In India, nationalists accustomed to refuting the overpopulation argument as simply another rationalization for British rule continue to flail

away, like punch-drunk fighters, at an imaginary enemy. The Roman Catholic Church, although numerically weak in most of the Malthusian nations (though not all, e.g. Puerto Rico), acts nevertheless as a compact opposition that exerts considerable influence, especially in comparison with the weak and poorly organized birth-control advocates.

THIS coalition of Communism, nationalism, and Catholicism would be formidable enough if Western thinkers were unanimous on the advisability of limiting population growth at least for the immediate future. But even among liberals, generally the least prejudiced group with regard to birth control, there are many who feel that any organized effort along these lines is a sop to "reaction." For them, the premise of the greatest good for the greatest number usually proceeds, by a peculiar involution of logic, to the conclusion that the greater the number, the greater the good, and they often look on proposals for limiting population growth as a slightly indecent scheme for curtailing the sum total of human happiness. Beyond this, they unfortunately tend to derive their position in many matters by a kind of conditioned reflex to the opposition. They pick up a book by one of the more extreme neo-Malthusians, and find it advocating population reduction on a mass scale with an almost genocidal fervor, and lamenting public health programs because the millions of lives saved have made the earth too crowded. The whole thing has a strong odor of callousness and isolationist greed, and they consider this sufficient reason for dismissing the entire problem.

Dr. Josue de Castro, Chairman of the Executive Council of the United Nations Food and Agriculture Organization, and author of *The Geography of Hunger* (Little, Brown, 1952), is such a liberal. He believes that everyone in the world should have enough to eat and that everyone can have enough to eat if only we set about it with a will. The neo-Malthusians irritate him very much. So in order to prove how wrong they are, he sets out to establish a thesis which is at least as fantastic as the drummings of his most fanatical opponents. In his own words, "Hunger is responsible for the overproduction of human beings, excessive in number and inferior in quality." Give everybody three squares a day, and the birth rate will drop like magic.

His argument is at least ingenious. Labora-

tory experiments with rats show that as the protein content of their diet goes up their fertility goes down. On 10 per cent protein, the average rat produces 23 offspring; on 22 per cent, his batting average drops to 14. And that's how it is with people: "The groups with highest fertility," Dr. de Castro declares, "are those who have the lowest percentage of complete proteins, animal proteins, in their regular diet. The highest birth rates in the world are registered by certain peoples of the Far East, Africa, and Latin America, where the proportion of animal products in the habitual rations does not reach 5 per cent of the total food consumed. In contrast to this, the lowest birth rates exist among the peoples of Western Europe, the United States, Australia, and New Zealand, where the proportion of foods of animal origin reaches, respectively, 17 per cent (Western Europe); 25 per cent (United States); and 36 per cent (Australia and New Zealand)." Dr. de Castro then appends a chart of 14 nations beginning with Formosa—birth rate 45.6, protein consumption 4.7 grams daily—and ending with Sweden—birth rate 15, protein consumption 62.6 grams daily.

Evidently, Dr. de Castro is not completely satisfied with his protein-deficiency theory of overpopulation. He offers an additional explanation of why hungry people tend to overpopulate the globe. Chronic hunger, it seems, sharpens the sex appetite.

Unfortunately for Dr. de Castro's central thesis, the population of pre-industrial nations, as the experience of 18th-century Sweden and 19th-century India proves, tends to soar, not decline, with the food supply. There is not the slightest historical evidence that more or better food by itself cuts down the birth rate. All it does is reduce the death curve. The experiment with the rats is interesting. But the trouble is—they're just rats. Dr. de Castro might try feeding potatoes to tigers, and find out how fertile *they* are on a non-protein diet.

The chart with Formosa at the top and Sweden at the bottom is interesting too, but there are some problems there. Australia, with the third highest protein consumption, has the third lowest birth rate—18.0. That is the 1940 figure. The 1947 birth rate for Australia was 24, that of New Zealand 26.4. How account for this jump? Did the two countries stop eating meat? Even infertile, meat-eating Sweden, with a birth rate of 15 down at the bottom of Dr. de Castro's list, jumped to 20.6 in 1944.

As for the theory that chronic hunger increases the sexual appetite and that this accounts for increased birth rates, it should be remembered that par for the human species is about one child a year. No matter how attenuated the sexual instinct in meat-eating countries, it is hard to believe that couples would not manage enough acts of sexual intercourse to produce a whopping birth rate, were it not for all the other factors that play no role in Dr. de Castro's theory.

In all fairness to the author, it should be admitted that he does have a corner of the truth. The trouble is, he is so anxious to beat down all opposition that, instead of using this corner of the truth, he exploits it. He understands that hunger is not necessarily caused by population density, that a nation like Holland with 717 inhabitants per square mile can be well fed, while Libya with 2.3 per square mile can be poorly fed. But he feels compelled to draw the extreme conclusion that there is *never* any necessary connection between population density and hunger. Doubtless, if world food production were placed on a rational, scientific basis and distributed equally, even the poorest and most densely populated nations would have enough to eat—at least for a while. But it is the reality of today's world, with its national borders, jealousies, and power blocs, its cartels, artificial shortages, subsidized waste, and inefficient agriculture, not the utopias of tomorrow, that the Malthusian nations must face now and for an indefinite time to come. Under these conditions, even the most sanguine optimist must admit that overpopulation makes the immediate problems so much the more acute.

BUT beyond this, given a continuous rate of increase, absolute world overpopulation independent of the food supply is not only possible but absolutely certain. If some great chemical genius should figure out a way to make sirloin steaks out of air, water, and earth mixed in a bathtub with a wooden paddle, the food problem would become a thing of the past, but the problem of ultimate overpopulation would not. For the total weight of the earth is 10^{25} pounds. If the world's population continued to increase at the rate of 1 per cent per year, which is slightly less than its present rate, in about 3,000 years the weight of human beings would equal the earth's weight—that is, the entire substance of the earth would have been digested by human beings! Long before that, of course, most of the

human race would be crushed to death by the sheer weight of their fellow men. Or, to confine the horror picture to our own hemisphere, if the population of the United States continues to increase at its present rate, in less than nine hundred years the entire country would be packed as tightly as a subway car in the rush hour.

Fortunately, nobody expects the present population increases to continue for any long period of time. Nevertheless, this *reductio ad absurdum* does point up the fact that optimum population may be determined by other than food factors. Contemporary headlines tell the same story. A 327-billion-dollar American economy is consuming raw materials at a rate that compels Britain to cut back her own production. Yet these raw material shortages crop up in a world that is still largely unindustrialized. The industrialization on a large scale of Asia, South America, and Africa would certainly accentuate the shortages to a tremendous degree, even if we assume that some new sources of raw materials would be developed in the process; consequently the standard of life of the more prosperous nations would surely fall. Conceivably, technology may be able to remedy some of these shortages by substitution, syntheses, or even transmutation. But the fact is that the pinch in raw materials is showing up here and now when the miracles still seem a long way off.

There are other aspects of the overpopulation problem that are not so susceptible to quantitative evaluation. Differential fertility is one of these. Robert C. Cook in his *Human Fertility: the Modern Dilemma* (William Sloane Associates, 1951) explores this question at length. He demonstrates that the least educated third of the population, at current rates of reproduction, will produce almost two-thirds of our great-grandchildren. In a country of universal compulsory education, there is probably a fairly close relation between degree of education and innate mental capacity, although other factors such as income, regional differences, and ethnic customs certainly play some role. If mental capacity is assumed to be even partially hereditary, then Cook's argument is impressive evidence that the nation is going mentally downhill.

This is a problem peculiar to the industrialized, non-Malthusian nations. In primitive economies, where the struggle for existence is grim, intelligence is probably an important factor in determining who lives and who dies. In the industrialized nations, the competition for

social advancement takes the place of the almost non-existent struggle for physical survival. And since limitation of families is a means of furthering the individual's social position, the more successful are weeded out by their own efforts. Thus, in those nations where human intelligence has been most successfully applied in creating material well-being, nature seems to take her revenge by discouraging intelligence from reproducing itself. This is a population problem for the non-Malthusian nations today, not in some hypothetical future.

The aesthetic aspects of overpopulation are also worth some thought. The early American pioneers were said to get restless whenever they could see the smoke of a neighbor's chimney a couple of miles away. Today, the conventional middle-class utopia "away from it all" is a six-room ranchhouse on a 50-by-100-foot plot somewhere in the suburbs of a large city. The relativism of the concept of crowding may be readily admitted; still, the area of a nation is constant and the result of an expanding population is to reduce the average acreage available for the enjoyment of the individual, whether in national parks or forests, open countryside, or simply his own backyard.

BY OVEREMPHASIZING the food aspects of the problem, the neo-Malthusians have done a disservice to the population question. Their claim that the world is teetering on the brink of mass starvation is unproved and unprovable, and has simply served as a convenient straw man for the opposition to knock down. But knocking over the straw man will not deal with the ultimate contradictions implied by a prospect of perpetual human increase; nor will it solve the real population problems that exist today. Each country has its own variant of these problems and since major decisions, at least for some time to come, will be made on a national basis, it would seem advisable for nations to set about studying these problems with at least a fraction of the energy they devote to other questions. After all, even the most mechanical utopian could hardly be entranced by the spectacle of a mass of jabbering robots operating a mountain of automatic machinery. For the more fortunate nations, it is time, as Julian Huxley has said, to pay some attention to the quality as well as the quantity of their citizens. For the less fortunate—and that is the great majority—the simple question of numbers still poses a most important human problem.